Salient Features of the 1937 Census of Manufactures

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THE value of manufactured products in 1937, while less than that in 1929, compared favorably with the total for any other census year, according to data recently made available by the Bureau of the Census.[1] The total value of products—$60,710,000,000—was more than one-third larger than in 1935, and about 11 percent less than in 1929; it was nearly double the figure for 1933, and approximated the aggregates for the census years 1919, 1923, 1925, and 1927.

As indicated by table 1, the rise of more than one-third in the value of products in 1937, as compared with 1935, was accompanied by a slightly larger gain in value added by manufacture. The number of wage earners recorded a gain of slightly less than one-fifth, and the amount of wages paid was about 38 percent higher. The wage earners' total was 2 percent more than in 1929; wage payments were about 7 percent less than in that year.

Value of Products.

The figures for value of products are on a dollar basis, and thus take no account of the significant variations in prices. Also, they contain a large but indeterminable amount of duplication resulting from the inclusion of the products of some industries as the raw materials of others. This duplication occurs as a rule between different industries, and is not found to any great extent in individual industries. According to an estimate made by the Bureau of the Census, the *net* value (at f. o. b. factory prices, not retail prices) of finished manufactured products made in 1929, in the form in which they reached ultimate consumers, was approximately two-thirds of the reported total value of products for all industries. No corresponding estimates for later years have been made.[2]

Value Added by Manufacture.

There is considerable evidence that the proportion of the total value of product representing duplication varies somewhat in the different census years. This factor is to a large extent eliminated in the data for value added by manufacture. "Value added" is the increment created by the manufacturing process; it is calculated by deducting from the value of products the cost of materials, containers, fuel, and purchased electric energy. Until the Census of 1937, however, this item also contained an element of duplication. Certain establishments, mainly in the clothing, leather-glove, and printing and publishing industries, perform contract work on materials owned by other establishments and report the amount received for such work as "value of products." This resulted in a duplication in the value of products not offset by a corresponding duplication in the cost of materials which are reported only by the establishment owning the materials. Since the value added by manufacture is simply the difference between value of product and cost of materials, the duplication in the former carried over to "value added."

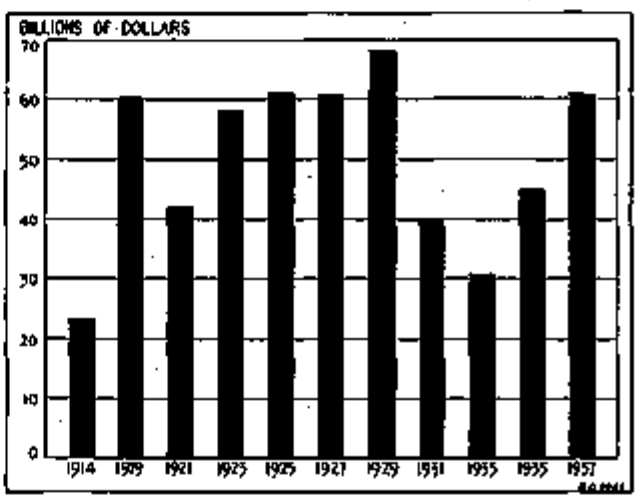

Figure 4.—Value of Manufactured Products for Census Years, 1914–37 (Biennial Census of Manufactures).

In 1937, contract work was for the first time included with other material costs. In table 1, comparable figures are given for 1935; but the cost of contract work was not reported by all industries in 1933, and it has not been segregated by the Bureau of the Census for earlier years. In 1935, contract work was valued at $463,045,000; the corresponding figure for 1937 is not yet available as a separate item, although, as already mentioned, it is included with cost of materials for 1935 and 1937 in table 1. Lacking the 1937 dollar figure for cost of contract work, it is not possible to readjust the figures for value added by manufacture to the old basis for the purpose of making long-term comparisons. It should also be noted that while there is no duplication in the figures for value added by manufacture, the element of price change is still present.

Wage Earners and Wage Payments.

In analyzing the data for employment and pay rolls, it should be borne in mind that technological changes have an important bearing on the average output per

[1] Data used throughout this article are based on preliminary reports of the Biennial Census of Manufactures, 1937, and final reports for earlier years.

[2] See Net Value of Manufactures, by Tracy E. Thompson, in the American Economic Review, December 1932.

worker, especially over a long period of time. Also, average weekly hours of work per wage earner have been sharply reduced in recent years, and wage rates have been increased. A third factor of importance is that the wage-earner totals include both part-time and full-time workers, and the proportion of one to the other varies in the several census years. On the other hand, the element of duplication is not present in these figures as in those for value of products. Thus, while a given manufacturer includes the products of his various supply industries in the cost of materials and value of products in his reports to the Bureau of the Census, he does not so include the suppliers' employment and pay-roll figures with his own.

Quantitative Output.

Changes in quantitative output are best measured by the Census index of physical volume.[3] Indexes for 1937 are not yet available, but the Federal Reserve monthly index of manufacturing production—which, over an extended period, has shown a rather close correspondence with the Census composite index of the quantity of production—provides an indication of the approximate change in the aggregate volume of manufactures from 1935 to 1937. According to this index, physical production was about one-fifth larger than in 1935. This percentage change applied to the Census composite index for 1935 yields a 1937 index approximately one-tenth lower than in 1929. The 1937 figure approximated that of 1925 and 1927, and was well above that of any other census year.[4]

Trends in Recent Years by Major Classes of Industry.

In table 2, trends for value of products, wage earners, and wage payments, since 1929, are shown for the 15 major groups into which the manufacturing industries are divided for census purposes. These are further classified roughly into two major groups—durable goods and nondurable goods. The classification of durable goods and nondurable goods by industrial groups is an approximation, since such a division can be accurately made only on a commodity basis. As examples, the forest-products industries, classified in table 2 as durable goods, include turpentine and rosin, wooden packing boxes, and matches; the durable-goods group entitled "stone, clay, and glass products" includes glass containers; and the group "iron and steel and their products" includes tin cans. The census group, "miscellaneous industries", comprises both durable and nondurable goods and includes such important lines as tobacco manufactures, fur goods, roofing, and photographic apparatus and materials.[5]

Durable and Nondurable Goods Industries.

Despite the limitations of the industrial classification used here, certain interesting comparisons can be made. The cyclical fluctuations of the durable-goods industries over the period 1929–37 were much wider than those of the nondurable-goods industries. As is shown in table 2, this applies with reference to all three of the measures used. For the durable-goods groups, the value of product was reduced about two-thirds from 1929 to 1933; for nondurable goods, the reduction was a little less than one-half. Durable-goods industries reduced their working forces by nearly one-half and their wage payments by two-thirds over this interval, whereas the producers of nondurable goods reduced employment 15 percent and wages 40 percent. In the period of cyclical improvement from 1933 to 1937, the durable-goods industries reported increases of about 177 percent in value of products and in wages paid, and 81 percent in the number of workers employed. For nondurable-goods producers, these gains were 64 percent, 57 percent, and 26 percent, respectively. With the 1933–37 recovery, the ratio of durable goods to nondurable goods was about the same as in 1929, although for both major divisions the value of products in 1937 remained about 11 percent below that in the predepression year. The number of wage earners in the durable-goods group remained slightly below the

[3] The index was originally computed by Warren M. Persons, and covered the census years 1899, 1904, 1909, and 1914. In a Census monograph entitled "The Growth of Manufactures, 1899–1923," Edmund E. Day and Woodlief Thomas extended the index to 1923, with certain departures from the methods used in the earlier compilations. Indexes for recent years were compiled by Aryness Joy and V. S. Kolesnikoff.

[4] The Census composite index based on 1899 as 100, and with the figure for 1937 estimated, is as follows: 1904, 123; 1909, 159; 1914, 170; 1919, 214; 1921, 160; 1923, 263; 1925, 274; 1927, 274; 1929, 311; 1931, 206; 1933, 191; 1935, 227; 1937, 274.

[5] For classification by commodities see Commodity Flow and Capital Formation, by Simon Kuznets, published by the National Bureau of Economic Research.

Table 1.—Summary Statistics for All Manufacturing Industries, 1914–37 [1]

Item	Unit	1914	1919	1921	1923	1925	1927	1929	1931	1933	1935	1937
Number of establishments	Thousands	269	270	192	192	184	188	207	171	139	168	167
Wage earners (average per year) [2]	Thousands	6,505	8,472	6,484	8,203	7,890	7,857	8,861	6,163	6,788	7,204	8,570
Wages	Millions of dollars	3,763	9,678	7,486	10,167	9,994	10,119	10,909	6,689	4,940	7,311	10,112
Cost of materials:												
Including cost of contract work	Millions of dollars										26,441	35,586
Excluding cost of contract work	Millions of dollars	13,954	36,380	24,446	32,858	35,104	34,946	37,441	21,229	16,550	23,976	(5)
Value of products	Millions of dollars	23,988	60,206	41,749	55,288	60,826	60,472	68,178	39,680	30,557	44,994	60,716
Value added by manufacture:												
Excluding cost of contract work [3]	Millions of dollars										18,462	25,174
Including cost of contract work [4]	Millions of dollars	9,386	23,804	17,308	24,030	25,732	26,420	30,737	18,601	14,008	19,016	(5)

[1] Plants with annual production valued at less than $5,000 are excluded beginning 1921; in 1914 and 1919, the minimum was $500. This does not materially impair the accuracy of the statistics except for the single item "number of establishments." Data for "Gas, manufactured, illuminating and heating" and for "Railroad repair shops" were not collected in 1937; the necessary adjustments have been made in the figures for earlier years.
[2] Data represent averages of monthly figures, and include both full-time and part-time workers.
[3] Calculated by subtracting cost of materials, containers, fuel, and purchased electric energy and cost of contract work from the value of products. See text.
[4] Calculated by subtracting cost of materials, containers, fuel, and purchased electric energy from the value of products. See text.
[5] Not available. See text.

Source: Biennial Census of Manufactures.

1929 figure, but for nondurable goods a gain of about 8 percent was recorded; wage payments were less in 1937 for both divisions.

Conformity with the usual cyclical pattern is also seen in the interrelationships of the three measures used. Uniformly, the declines in value of products and wages paid from 1929 to 1933 and the increases from 1933 to 1937 were sharper than the corresponding changes in the number of wage earners.

Transportation Equipment.

According to table 2, transportation equipment is the only durable-goods group for which the aggregate value of products in 1937 approximated that of 1929. The number of wage earners and the amount of wages paid were higher than in 1929. The physical volume of output, however, was somewhat lower in 1937 than in the more prosperous year. In this census group, duplication in the value of products is large. Thus, the value of products for the motor-vehicle bodies and motor-vehicle parts industry (not including engines for sale as such, tires, springs, batteries, ignition apparatus, starting and lighting systems, and stamped sheet-metal parts for automobiles) amounted to $2,079,000,000 in 1937, an *increase* of more than one-half billion dollars over 1929. The value of products for this industry is to a large extent duplicated in the corresponding figure for the motor-vehicle industry, which in 1937 amounted to $3,096,000,000, a *decrease* of more than $600,000,000 from 1929. This divergent movement indicates that the parts and bodies industry contributed a larger proportion of the total value of finished vehicles in 1937 than in 1929, and that for the group total shown in table 2 there was somewhat more duplication in the figures for 1937 than in those for 1929.

The value of products for the motor-vehicle industry alone gives a fairly good indication of the trend for the industry as a whole, although price changes and the increasing proportion of low-priced models to total output affect the long-term comparisons. The value of products for the motor-vehicle industry declined 17 percent from 1929 to 1937, while the number of units produced dropped 12 percent. Although wage earners and the amount of wages paid showed gains over 1929, total man-hours worked declined considerably, a situation which also applies in many other industries. In the automobile industry, for which comparable figures are readily available, employment and pay rolls were both higher in 1937 than in 1929. Total man-hours worked, however, were reduced about one-sixth, according to National Industrial Conference Board data.

Iron and Steel and Their Products.

Industries classified under iron and steel and their products, not including machinery, reported output for 1937 valued at only about 6 percent less than in 1929 and more than two and one-half times as large as in 1933. The individual industries in this group generally reported declines from 1929; value of products for the steel works and rolling mills (including all departments, such as nut and bolt, wire, tin plate, etc.), however, was practically unchanged for this comparison. The number of wage earners was about 10 percent higher than in 1929, and wage payments were about 2 percent larger.

Machinery, Not Including Transportation Equipment.

The more important machinery industries generally reported a larger value of output in 1937 than in 1929, the major exception being the electrical machinery, apparatus, and supplies, and the engines, turbines, waterwheels, and windmills classifications. Operations in plants manufacturing agricultural implements (including tractors) were at a peak, with the value of output about twice that of 1929. Machine tools produced were also larger in value than in any previous year, exceeding the 1929 value by a small margin. Total output for the machinery group was about 9 percent less in value than in 1929, but more than three times as large as in 1933. The number of wage earners employed was about the same as in 1929, and double that of 1933. Wage payments were about 5 percent less than in 1929, but almost three times as large as in 1933.

Other Durable-Goods Industries.

Value of output of the stone, clay, and glass industries was about 11 percent lower in 1937 than in 1929. Output of plate-glass and glass containers, particularly beer bottles and liquor ware, was much larger than in 1929, but these gains were more than offset by the reduced volume of cement, concrete products, brick, and pottery. For the entire group of industries, the number of wage earners was about 9 percent less in 1937 than in 1929, and wages paid were about one-fifth lower.

The three major nonferrous metal industries showed sharply divergent trends over the 1929–37 interval. Value of output for copper refineries was more than one-fourth lower than in 1929, and zinc smelters and refiners reported a decline of 3 percent. On the other hand, lead smelters and refiners reported a rise of about one-tenth in the value of output. Production of metal alloys was also sharply reduced. In the aggregate, the value of product for the nonferrous-metals group in 1937 was 18 percent lower than in 1929, and wage payments were reduced about 11 percent. The number of wage earners was only slightly less than in 1929.

Nondurable-Goods Industries.

Among the nondurable-goods industries, several classifications showed value of output, number of wage earners, and amount of wages paid, all larger in 1937 than in 1929. The largest gain in value of product was that for the paper and allied products group, which reported a rise of 9 percent. Within the group, the pulp industry experienced a small rise, the paper in-

dustry a small decline, and several of the more important paper-products industries reported marked increases. Wage earners in this group increased 13 percent and the amount paid in wages 7 percent, in 1937 as compared with 1929.

Industries classified in the chemicals and allied products group reported value of products for 1937 approximately the same as in 1929. The value of drugs and medicines, fertilizers, and paints, pigments, and varnishes was somewhat lower than in 1929, and the value of soap produced was slightly reduced. Such declines, however, were offset by gains in rayon and allied products, and in a long list of industrial and miscellaneous chemicals. The number of wage earners and the amount of wage payments for this group in 1937 were well above those of 1929. Group totals for food and kindred products and for products of petroleum and coal reported only small reductions in value of products, and for these, as for the other nondurable-goods groups mentioned above, the number of wage earners and the amount paid in wages were both larger than in 1929. The 1937 totals for food and kindred products, however, were greatly influenced by the marked expansion in the production of beer and liquor; most of the other major industries in this group showed declines over the 1929–37 interval.

The sharpest decline in the value of products in 1937 as compared with 1929 was that reported by the textile industries. Aggregate wage payments were also slightly lower for these industries in 1937, but the number of wage earners employed increased.

Changes in Value of Product.

All but 12 of the 299 industries for which comparable data are available showed gains in the value of production in 1937 as compared with 1935 (see fig. 5). The largest relative increases were reported for railroad, mining, and industrial locomotives. Output of this industry in 1937 was valued at more than four times that of the preceding census year, when operations were low compared with other important lines. This industry, as constituted for census purposes, does not include the manufacture of locomotives by electric and steam railroad companies, or by establishments manufacturing electrical products primarily. Production of locomotives by the railroads was also larger in 1937, but the gain was not so marked as that recorded for the locomotive industry as such. All other industries for which the value of output in 1937 was more than double that of 1935 were in the durable-goods classifications and included aircraft and parts (not including engines), machine tools, and copper smelting and refining.

Sixty-one of the industries classified reported increases ranging from 50 to 100 percent in 1937. These gains were largely confined to the durable-goods industries and were for the most part in continuation of the cyclical upswing in production which began in 1933. Among the nondurable-goods industries, such increases were largely confined to textiles and their products.

A total of 110 industries reported gains in value of output of 25 to 50 percent. Of the 90 durable-goods industries, 33 were included in this percentage group, and for the 165 nondurable-goods industries, the proportion was only slightly smaller. Gains ranging up to

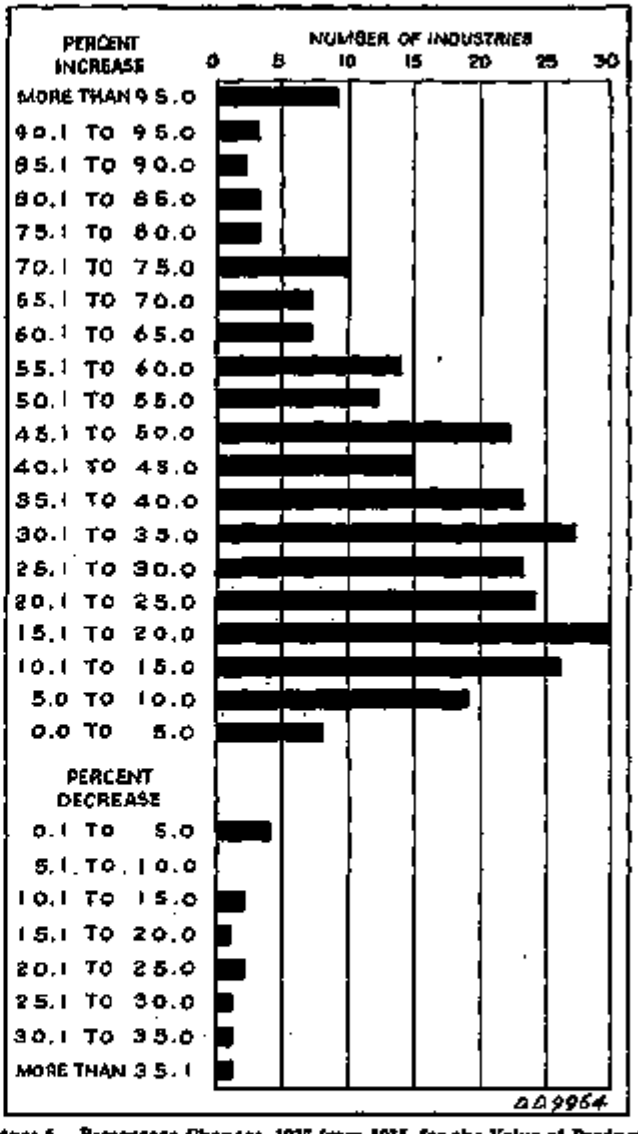

Figure 5.—Percentage Changes, 1937 from 1935, for the Value of Products of 299 Manufacturing Industries.

Note.—Data used are taken from the preliminary reports of the Biennial Census of Manufactures for 1937. The reports give 1937 data for 337 industries; the chart is based on 299 of these for which figures comparable with 1935 are available. It is not possible to make comparisons between 1937 and 1935 figures for 38 industries, chiefly in the textile group, because of changes in the number of manufacturers reporting, greater detail in the items reported, and because of additional break-downs between contract and regular factories.

25 percent were reported by 107 of the classified industries; nearly one-half of those in the nondurable-goods classification fell in this percentage group, while for the durable-goods industries, only about one-tenth were included. Declines in the value of production in 1937 as compared with the preceding census year were mostly restricted to a few of the textiles and food industries and several of the "miscellaneous" industries.

Table 2.—General Statistics for Industry Groups, 1929–37 [1]

Industry	Unit	1929	1931	1933	1935	1937	Percentages of 1929: 1929	1931	1933	1935	1937
DURABLE GOODS											
Forest products:											
Value of products	Millions of dollars	3,521	1,647	1,127	1,662	2,449	100.0	46.6	31.9	47.1	68.1
Wage earners	Thousands	947	510	454	679	664	100.0	53.8	52.4	65.6	90.1
Wages	Millions of dollars	929	440	289	418	627	100.0	47.5	31.2	47.3	68.7
Stone, clay, and glass products:											
Value of products	Millions of dollars	1,581	925	509	910	1,398	100.0	58.3	32.0	60.1	88.4
Wage earners	Thousands	328	223	173	233	300	100.0	67.9	52.7	71.0	91.4
Wages	Millions of dollars	422	240	142	226	349	100.0	57.5	32.8	62.2	80.6
Iron and steel and their products, not including machinery:											
Value of products	Millions of dollars	7,991	3,690	2,759	4,580	7,480	100.0	46.2	34.7	57.4	93.6
Wage earners	Thousands	1,094	717	656	870	1,106	100.0	67.3	61.6	82.5	100.6
Wages	Millions of dollars	1,631	832	585	991	1,651	100.0	51.0	35.9	60.8	101.9
Nonferrous metals and their products:											
Value of products	Millions of dollars	3,399	1,327	951	1,660	2,783	100.0	39.1	28.0	49.2	82.0
Wage earners	Thousands	275	180	145	216	270	100.0	65.7	52.5	78.3	98.4
Wages	Millions of dollars	393	230	140	233	349	100.0	58.3	35.6	59.1	88.8
Machinery, not including transportation equipment:											
Value of products	Millions of dollars	6,470	3,126	1,889	3,493	5,892	100.0	48.3	29.2	54.0	91.1
Wage earners	Thousands	958	605	471	687	958	100.0	63.0	49.0	71.7	99.0
Wages	Millions of dollars	1,450	701	445	800	1,376	100.0	48.3	30.7	55.2	94.6
Transportation equipment—air, land, and water:											
Value of products	Millions of dollars	6,038	2,882	2,047	4,200	6,086	100.0	47.0	34.0	71.2	90.5
Wage earners	Thousands	575	370	303	476	624	100.0	64.1	52.7	82.8	108.3
Wages	Millions of dollars	935	464	310	653	967	100.0	49.6	33.8	69.7	103.5
Total durable-goods groups:											
Value of products	Millions of dollars	28,984	13,596	9,391	16,649	25,979	100.0	46.9	32.4	57.5	89.7
Wage earners	Thousands	4,070	2,604	2,213	3,070	4,011	100.0	64.0	54.4	75.4	98.6
Wages	Millions of dollars	5,708	2,886	1,916	3,340	5,238	100.0	50.3	33.3	57.9	92.5
NONDURABLE GOODS											
Food and kindred products:											
Value of products	Millions of dollars	11,606	7,968	6,404	9,511	11,205	100.0	68.6	55.9	81.9	97.1
Wage earners	Thousands	735	635	606	797	885	100.0	86.1	80.3	108.1	120.4
Wages	Millions of dollars	891	726	621	800	978	100.0	81.5	69.7	89.8	109.8
Textiles and their products:											
Value of products	Millions of dollars	9,249	6,656	4,811	6,061	7,009	100.0	63.3	52.0	65.5	76.3
Wage earners	Thousands	1,711	1,422	1,477	1,685	1,816	100.0	83.2	86.3	98.7	106.1
Wages	Millions of dollars	1,735	1,240	1,010	1,371	1,550	100.0	71.4	58.7	79.0	89.3
Paper and allied products:											
Value of products	Millions of dollars	1,892	1,358	1,173	1,523	2,001	100.0	71.7	62.0	80.5	105.9
Wage earners	Thousands	233	195	198	235	264	100.0	83.4	84.1	101.0	113.3
Wages	Millions of dollars	287	214	173	235	307	100.0	74.6	60.2	82.0	106.9
Printing, publishing, and allied industries:											
Value of products	Millions of dollars	3,158	2,488	1,720	2,165	2,583	100.0	78.8	54.7	68.6	81.9
Wage earners	Thousands	356	316	263	305	353	100.0	88.8	73.9	85.6	99.1
Wages	Millions of dollars	634	536	354	446	533	100.0	84.6	55.9	70.4	84.0
Chemicals and allied products:											
Value of products	Millions of dollars	3,703	2,651	2,118	2,697	3,722	100.0	71.6	57.2	72.8	100.5
Wage earners	Thousands	279	230	237	276	315	100.0	82.5	85.1	99.0	112.7
Wages	Millions of dollars	352	263	221	286	381	100.0	74.5	62.7	81.2	108.4
Products of petroleum and coal:											
Value of products	Millions of dollars	3,135	1,707	1,676	2,118	2,954	100.0	57.3	50.4	67.6	94.2
Wage earners	Thousands	104	86	84	96	106	100.0	82.2	80.8	92.5	102.3
Wages	Millions of dollars	169	133	108	134	177	100.0	78.7	63.8	79.2	104.7
Rubber products:											
Value of products	Millions of dollars	1,117	614	473	678	825	100.0	55.0	42.3	60.6	79.0
Wage earners	Thousands	149	99	106	116	130	100.0	66.6	71.3	76.9	87.0
Wages	Millions of dollars	207	113	99	164	171	100.0	54.3	47.8	64.5	82.6
Leather and its manufactures:											
Value of products	Millions of dollars	1,906	1,189	907	1,224	1,402	100.0	62.4	48.3	64.2	73.3
Wage earners	Thousands	318	272	282	311	333	100.0	85.0	88.6	97.6	104.3
Wages	Millions of dollars	390	292	225	280	312	100.0	72.9	61.0	77.8	86.7
Total nondurable-goods groups:											
Value of products	Millions of dollars	35,704	23,911	19,477	26,117	33,029	100.0	66.0	54.5	73.0	89.5
Wage earners	Thousands	3,880	3,236	3,313	3,634	4,202	100.0	83.7	85.3	93.8	108.1
Wages	Millions of dollars	4,635	3,497	2,840	3,085	4,408	100.0	75.2	60.8	70.5	95.1
Miscellaneous:											
Value of products	Millions of dollars	3,460	2,325	1,690	2,227	2,713	100.0	67.3	48.9	64.6	78.4
Wage earners	Thousands	422	380	283	319	355	100.0	71.8	62.2	73.5	84.2
Wages	Millions of dollars	500	306	206	395	306	100.0	60.4	40.7	56.2	72.3
Total, all industries:											
Value of products	Millions of dollars	68,178	39,830	30,557	44,994	60,710	100.0	58.4	44.8	66.0	89.0
Wage earners	Thousands	8,381	6,163	5,788	7,204	8,570	100.0	73.5	69.1	86.0	102.3
Wages	Millions of dollars	10,910	6,689	4,940	7,311	10,113	100.0	61.3	45.3	67.0	92.7

[1] In accordance with changes in classifications in the 1937 Census, figures for the period 1929–35 have been revised as follows: "Boiler shop products" and "Foundry products" have been removed from "Machinery, not including transportation equipment," and placed in "Iron and steel and their products." For this change, the necessary data relating to the value of products were available for the full period, but for wage earners and wages paid, separate figures for boiler shop products and foundry products were not available for 1929 and 1931. It was therefore necessary to make a somewhat arbitrary adjustment in the figures for these two years. For the period 1933–37, these two industries employed about 13 percent of the total wage earners in the "Machinery" group, and paid about 12 percent of total wages. Variations in these percentages for the three census years 1933, 1935, and 1937 were slight. Accordingly, 13 percent of the total wage earners and 12 percent of the wages for the machinery group in the years 1929–31 were transferred to "Iron and steel", in order to obtain more nearly comparable data for the two groups over the full period.

A second classification change in the census for 1937 involved shifting "Carriages and sleds, children's" from "Transportation equipment" to "Miscellaneous;" the necessary adjustments have been made in the figures for earlier years. A third adjustment involved the removal of the 1929–35 figures for (a) "Gas, manufactured, illuminating and heating" from "Products of petroleum and coal," and for (b) "railroad repair shops," since these data were not included in the census in 1937.

Source: Biennial Census of Manufactures